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I find only two pronounced extremes in this reduction from the species. One of these is the variety *densum*, with longer leaf points; the larger forms of this occur all over Europe, and in North America; the slender forms include Fowler's plant from Scotland, Williams' from the Yukon region, and *Ditrichum Macounii*. The other of them is not so common, but occurs in England. in Northamptonshire, coll. Dixon ("teste Braithw."), in Canada, Rocky Mts. (D. *flexicaule brevifolium*=D. *elatum* Kindb), and abundantly in the upper Mississippi valley. It seems to me that Dr. Kindberg's first name *Ditrichum flexicaule brevifolium*, very appropriate for this short-leafed form, should stand. But I hardly think that either D. *elatum* or D. *Macounii*, will eventually stand as different species.

CLIMACIUM WEB. & MOHR. ITER SUEC. 96. 1804.

Large handsome mosses with a tree-like habit of growth from underground creeping stems (Fig. 1. a). Sometimes prostrate, or floating in very wet places. Stem and branches-bearing paraphyllia (*i. e.* branching filaments which are chlorophyll-bearing). The leaves are arranged evenly on all sides of the stems and branches and are all somewhat decurrent but vary greatly in shape and structure. The leaves figured are from the middle of well developed branches. The leaves of the main upright stems are very large, thin, with little chlorophyll, closely imbricated and clasping. Branch leaves smaller, of a different shape and texture, chlorophyllose. All our species are dioicous. The seta is long and smooth, twisted to the right when dry. Calyptra split on one side, long, reaching to the base of the capsule. Capsule erect, cylindric; operculum conic-rostate with the beak often oblique; annulus none; peristome double; teeth linear-lanceolate, very long, closely articulate, minutely papillose, without the fine transverse lines on the lower part of the teeth that characterize the Hypnaceae; segments as long as the teeth, keeled, split between the articulations, often split to the apex when old, united at the base into a continuous narrow basal membrane, minutely papillose; spores minutely papillose.

Mosses of swampy woods and fields; fruiting with comparative infrequency. The systematic position of this genus is as yet undetermined. It certainly does not belong in the Isotheciae where it has previously been placed. The lack of transverse lines on the peristome teeth indicates that it is either not closely related to the Hypnaceae or else is a very highly modified member of that family. It has been placed with the Fontinalaceae but there is much to be said against this view. Perhaps a separate subfamily Climaceae of the Hypnaceae will be as satisfactory arrangement as can be made with our present knowledge. There are three species known to North America, one of which, *C. dendroides*, is common in Europe.

1. Capsules 3 to 4 times as long as broad; median leaf cells 10 times as long as broad, C. dendroides.
   Capsules 5–6: 1; median leaf cells 2–7: 1, 2.

2. Plants of a distinctly tree-like habit: median leaf cells
5-7: 1, C. Americanum.
Plants growing in dense tufts so that the tree-like habit is
obscured, or prostrate and hypnoid in appearace;
median leaf cells 2-3: 1, C. Kindbergii

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1. Climacium Dendroides (L.) Web. & Mohr, l. c.

Plants bright green, 7-9 cm. high; branches spreading, flexuous; branch leaves loosely imbricate, 2 x 0.7 mm., the upper oblong lanceolate; lower ovate—lanceolate; denticulate at base, sharply serrate above, obtuse, bisulcate, costate nearly to apex; basal angles sometimes slightly enlarged;

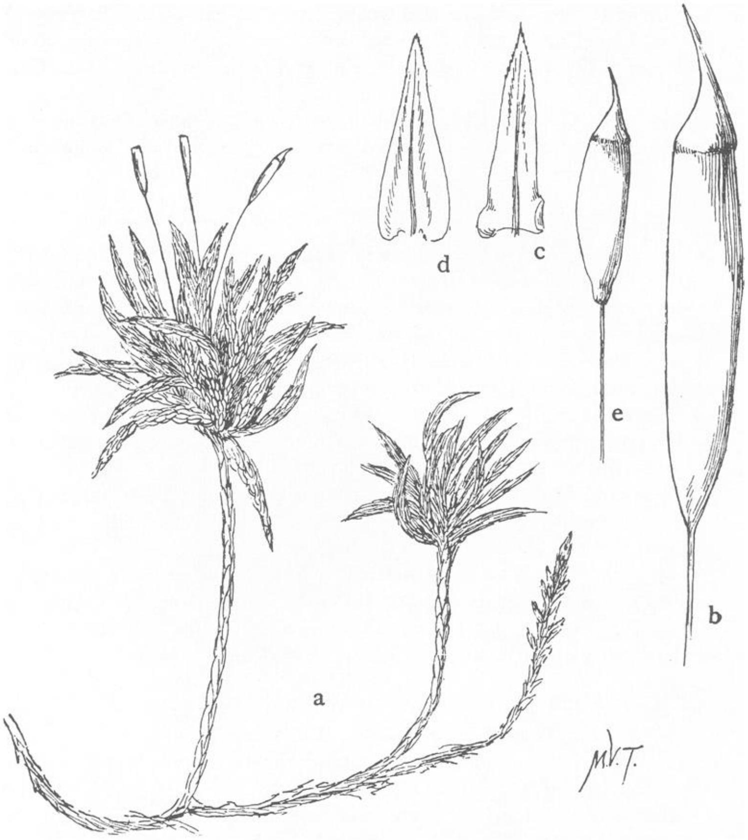

Fig. 1. a, *Climacium Americanum* x 1. b, Capsule x 10. c. Branch leaf x 10. d, Branch leaf of *C. dendroides* x 10. e, Capsule of the same x 10.

median cells linear-rhomboidal to linear hexagonal, 7–10:1; alar and apical cells much shorter and broader; stem leaves larger, 2–3 mm. long, ovate, entire, apiculate.

Inner perichaetial leaves oblong to oblong-ovate, slightly serrate at the apex, long acuminate, thinly costate, costa often short or wanting: leaf brownish yellow below: seta 2.5–3.5 cm. long, reddish brown; capsule lighter in color, cylindric, about *4 cmm. long, 3–4:1;* operculum often remaining attached to columella; peristome reddish-brown; spores 0.013–0.022 mm. in diameter, maturing in autumn.

Type locality European, probably Swedish.

Wet ground, borders of streams, swamps and lakes, especially in the mountains; more common than is indicated by Lesq. & James in the Manual. Ranging through the northern and western part of the continent from New Brunswick to St. Paul Island, Behring sea; south to New Jersey, Colorado and California. Not recorded from Pennsylvania or the North Central States.

A form from Oregon with "leaves narrowed at base, less serrate at apex, sometimes subentire" is called var. *Oregonense* by Renauld and Cardot.

2. CLIMACIUM AMERICANUM BRID. SP. MUSC. SUPPL. PART **2**:45. 1812.

Plants bright green, 5–7 cm. high; branches usually straight and tapering; branch leaves closely imbricate, 2 x 1 mm.; upper oblong-lanceolate, *broadly auriculate:* lower ovate to ovate-lanceolate, denticulate below, sharply serrate above, more acute than in the last, bisulcate, costate nearly to the apex; leaf cells more nearly uniform than in *C. dendroides*; median cells oblong-hexagonal 5–7: 1; stem and perichaetal leaves as in *C. dendroides.* Seta 2–3 cm. long, brown: capsule cylindric, brown, *about 6 mm long 5-6:1;* peristome reddish brown, teeth sometimes slightly perforated: spores 0.014-0.018 mm., maturing in autumn.

Distinguished from *C. dendroides* by its more closely imbricated leaves, broadly auriculate branch leaves, longer capsules and leaf cells.

Swamps, wet soil and rocks, rotten logs, etc.

This species is exclusively American. It is found in the northern and eastern States, ranging from Canada to North Carolina and probably south to the Gulf; west to Minnesota, Iowa, Illinois and Missouri. "Rocky mountains eastward," Röll in Hedwigia, **36**: 46. 1897.

3. CLIMACIUM KINDBERGII (R. & C.) GROUT.

C. Americanum Kindbergii R. & C. Bot. Gaz. **15**: 1890.

Plants *dark green, almost black,* below rarely lighter green, *growing typically in dense tufts or cushions* in very wet swamps, somewhat tree-like in habit, but growing so compactly together as to obscure the dendroid appearance. On the edges of pools and on sticks and stones, in pools the stems are decumbent, irregularly branching, often floating, dendroid secondary stems rarely present.

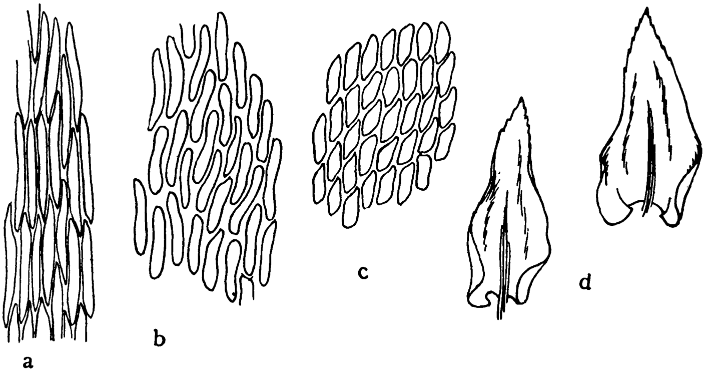

Fig. 2. a, Median leaf cells of *Climacium dendroides* x 250. b, Same of *C. Americanum* x 250. c, Same of *C. Kindbergii* x 250. d, Two branch leaves of *C. Kindbergii* x 10.

Stem leaves scattering, ovate; branch leaves ovate-lanceolate, somewhat auriculate, less differentiated than in *C. Americanum*, clasping by enlarged rounded basal angles, sulcate; areolation nearly uniform; median cells oblong-hexagonal, 2-3: 1. Seta usually much longer and more flexuous than in *C.Americanum* capsule abont the same as in that species, 2-4 cm. long; teeth of peristome usually more or less perforate.

Exsiccati.—Austin Musc. Appal. 289: Ren. & Card. Musc. Am. Sept. Exsic. 238.

The specimens of Sull & Lesq. Musc. Bor. Am. Ed. 2, 42. in the Columbia College Herbarium are this variety as are also Drummond's Musc. Am. (S. States) 120.

A closer study of this form has convinced me that it is a good species closely related to *C. Americanum* as occasional forms with the short leaf cells and a dendroid habit or auriculate leaves are occasionally met with. The typical form seems most abundant along the coast and in the South, but in general this species has the range of *C. Americanum*, but is much less frequent inland than that species. Aquatic forms of the other two species may be confused with this.

Usually distinguished at a glance by its color and habit of growth: surely determined by the larger, proportionately broader branch leaves without the conspicuous auricles of *C. Americanum* yet more auriculate than *C. dendroides*, and specially by its very short leaf cells.

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*The distinguishing characteristics of each species are printed in italic.

**The heavy faced numerals indicate volume numbers and the numerals immediately following the semicolon indicate pages.